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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/725,670	12/01/2003	Purakh Raj Verma	1016-033	5118
22898	7590	12/30/2004	EXAMINER	
THE LAW OFFICES OF MIKIO ISHIMARU 1110 SUNNYVALE-SARATOGA ROAD SUITE A1 SUNNYVALE, CA 94087			LEE, GRANVILL D	
			ART UNIT	PAPER NUMBER
			2825	

DATE MAILED: 12/30/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/725,670

Applicant(s)

VERMA ET AL.

Examiner

Granvill D Lee, Jr

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 01 December 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-32 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-32 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 01 December 2003 is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☒ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## **DETAILED ACTION**

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-2, 5-10, 13-18, 21-25 and 28-32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chantre (US Pat. 6,384,469) in view of Menut et al. (US Pub. 2003/0082882).

In view of these claims (esp. claims 1,9-10,16-17 and 25) method for manufacturing a heterojunction bipolar transistor comprising: providing a substrate (Fig. 6 #1) forming an intrinsic collector (#6) structure on the substrate, forming an extrinsic base (#61) structure partially overlapping the intrinsic collector(#4) structure forming an intrinsic base (#60) structure adjacent the intrinsic collector structure and under the extrinsic base(#61) structure, forming an emitter structure(#80) adjacent the intrinsic base (Fig. 6 #60) structure, forming an extrinsic collector (#63) structure adjacent the intrinsic collector structure, forming an interlevel dielectric layer(#7 and #8), but fails to form a plurality of contacts through the interlevel dielectric layer to the extrinsic collector structure, the extrinsic base structure, and the emitter structure. Menut et al. operates a lateral bipolar device where the contacts are

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formed through an interlevel dielectric (#70) to the extrinsic collector (#16), base (#60) and emitter (#17) regions (Abstr. & Fig. 17).

Therefore, it would have been obvious to a person of ordinary skill in the art at the time of the invention to modify the vertical bipolar teachings of Chantre to apply the lateral bipolar teachings of Menut et al. with the expectation of achieving better output current results (Para. 6). Menut et al. considered a wider intrinsic base region without an increase in integration density, which eliminated the vertical concepts in favor of a special lateral design (Para. 17).

In view of claims 2 and 22, Chantre discloses a device, wherein forming the intrinsic base structure selectively grows a compound semiconductive material adjacent the intrinsic collector structure (Col. 4 lines 42-44).

In view of claims 5, 13, 21 and 28 Chantre forms an emitter structure (#80) covering and parallel to the intrinsic base structure (#60), and forming a collect structure (#63) that is perpendicular to the emitter (Fig. 6).

In view of claims 6, 15, 18 and 31, Chantre forms a heterojunction bipolar transistor by forming the intrinsic base structure forms a structure comprising at least one of silicon-germanium, silicon-germanium-carbon, and a combination thereof (Col. 4 lines 42-44).

In view of claims 7 and 23, Chantre forms a heterojunction bipolar transistor forming the extrinsic base (#61) structure over the intrinsic collector

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(#4) structure comprises forming a base stack comprising the extrinsic base structure and an emitter structure (Fig. 6).

In view of claims 8, 14, 24 and 30, Menut et al. forms a heterojunction bipolar transistor with an intrinsic collector structure comprising, forming a first trench (#2) in the substrate, and forming a second trench in the substrate spaced from the first trench to form the intrinsic collector structure between the first trench and the second trench (Clm. 1).

In view of claims 10 and 29, Chantre includes a base stack design with an extrinsic base and emitter structures.

In view of claim 32, Chantre includes a base stack design with an extrinsic base (#61) in contact with an intrinsic base (#60), an extrinsic collector (#63) adjacent to the intrinsic collector (#4), and an extrinsic emitter (#17).

Claims 3-4, 11-12, 19-20 and 26-27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chantre (US Pat. 6,384,469) in view of Menut et al. (US Pub. 2003/0082882) in further view of Babcock et al (US Pub. 2003/0025125).

In view of these claims Chantre makes a heterojunction bipolar transistor comprising: providing a substrate, forming an intrinsic collector structure on the substrate, forming an extrinsic base structure partially overlapping the intrinsic collector structure, forming an intrinsic base

structure adjacent the intrinsic collector structure and under the extrinsic base structure, forming an emitter structure adjacent the intrinsic base, as discussed. Menut et al. considers a wider intrinsic base design for the intrinsic and extrinsic collectors. But both inventors fail to show a design where the forming of an extrinsic base structure surrounds the emitter structure with the forming of the collector surrounding the extrinsic base.

Babcock et al. considers a design where the extrinsic base (Fig. 3#34) surrounds the emitter structure (#42e) and the collector structure (#42c) is adjacent to the extrinsic base structure (Fig. 3#34).

Therefore, it would have been obvious to a person of ordinary skill in the art at the time of the invention to modify the bipolar teachings of Chantre and Menut et al. with the bipolar teachings of Babcock et al. with the application of a particular device operation depending on device design. Babcock et al. thought it best to consider heavily doped regions of the base to act as a source of dopants in the formation of the surrounded emitter (Para. 36).

In continued view of claims 4, 12, 20 and 27, Babcock et al. suggests that alternating shapes can be used depending on device application (Para. 38).

### ***Contact Information***

Any inquiry concerning this communication or earlier communications for the examiner should be directed to Granvill Lee whose telephone number is (571) 272-1897. The examiner can be

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normally reached on Monday thru Friday from 8:00 am to 4:30 pm.

If attempts to reach the examiner by telephone are not successful, the examiner's supervisor, Matthew Smith can be reached on (571) 272-1907. The fax phone number for this group is (703) 872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Examiner  
Granvill Lee  
Art Unit 2825

Gl  
12/26/04

*C. Granvill Lee*  
GRANVILLE LEE  
PATENT EXAMINER